

CLAIMS

1. An electronic component feeder (100) for loading a plurality of pallets (3, 3L, 3S) on each of which a component feed tray (2, 2L, 2S) for carrying a plurality of electronic components (1) arranged in alignment are placed in a plurality of stacked tiers, for feeding the electronic components on the component feed tray placed on a pallet unloaded from among the loaded pallets to an electronic component feed position (107) along a pallet feed direction (A), the feeder comprising:

a magazine (4, 4L, 4S), in which a plurality of pairs of support sections (14) for supporting mutually opposed edge portions (3c) of the pallets in a direction perpendicular to the pallet feed direction so that the pallets are supported roughly horizontally and movably in the pallet feed direction are formed at regular intervals in a stacking direction, for loading the pallets supported by the corresponding pairs of support sections;

a magazine receiver (5) for receiving the magazine elevatably, which has a pallet feed port (6) for allowing the pallets loaded in the magazine to be unloaded from inside the magazine to an electronic component feed position;

a magazine elevation unit (8) for driving

elevation of the magazine inside the magazine receiver while allowing a selected pallet to be unloaded through the pallet feed port;

5 a forward-side regulating member (18) for regulating support positions of the pallets loaded in the magazine by the corresponding support sections by being brought in contact with an edge portion of the pallet on a forward side in the pallet feed direction;

10 a rearward-side regulating member (24), movable in the pallet feed direction, for regulating support positions of the pallets regulated by the forward-side regulating member by the corresponding support sections by being brought in contact with an edge portion of the pallet on a rearward side in the pallet feed direction; and

15 a horizontal posture regulating member (26), which is provided integrally with the magazine, for regulating the roughly horizontal support posture of the pallets so that the support posture of each of the pallets, whose edge portions are supported by the corresponding
20 pairs of support sections, by being arranged between the pallets stacked in tiers in the magazine,

the pallets being formed so that configurations of a forward-side edge portion and a rearward-side edge portion in the pallet feed direction are formed differently,
25 the feeder being able to detect inclusion of the pallet

supported in a reversely directed support posture in the
pallet feed direction in the magazine on the basis of the
regulation position of the pallet by the rearward-side
regulating member, and the feeder being able to detect
5 inclusion of the pallet in a support posture supported by
support sections that are not mutually opposed in the
magazine by means of the horizontal position regulating
member.

2. The electronic component feeder as claimed in
10 claim 1, wherein

the magazine is provided with a magazine door
section (22) which is an openable door provided on the
rearward side in the pallet feed direction for feeding and
loading the pallets from the rearward side and on the
15 inside of which the rearward-side regulating member and the
horizontal posture regulating member are fixed,

wherein the rearward-side regulating member can
limit closing of the magazine door section by bringing in
contact with the edge portion of the pallet supported in
20 the reversely directed support posture, the magazine door
section can be closed in a position where the rearward-side
regulating member is brought in contact with the edge
portion of the pallet supported in a forwardly directed
support posture in the pallet feed direction,

25 the horizontal posture regulating member can

limit closing of the magazine door section by bringing in contact with the edge portion of the pallet supported by the support sections that are not mutually opposed, the magazine door section can be closed by inserting the horizontal posture regulating member between the pallets supported by the pair of support sections, and

inclusion of the pallet that has abnormality in its support posture in the magazine can be detected by the limitation of the closing of the magazine door section.

3. The electronic component feeder as claimed in claim 2, further comprising:

a door opening/closing detector (28, 29) for detecting the open state or the closed state of the magazine door section; and

a door opening and closing display section (19) for displaying a detection result by the door opening/closing detector while allowing an operator to recognize the result.

4. The electronic component feeder as claimed in claim 3, wherein

the magazine receiver has a receiver door section (20) that is an openable door provided on the rearward side in the pallet feed direction, for being closed in a state in which its inside (25) is brought in contact with outside of the magazine door section in the closed state, for being

limited its closing by bringing in contact with the outside of the magazine door section to limit the closing.

5 5. The electronic component feeder as claimed in claim 4, wherein the door opening/closing detector (28) is provided for the receiver door section.

6. The electronic component feeder as claimed in claim 3, further comprising a control unit (9) for stopping driving operation of the magazine elevation unit when the open state of the magazine door section is detected by the door opening/closing detector.

10 7. The electronic component feeder as claimed in claim 2, wherein the horizontal posture regulating member is provided with a plurality of projections (26a) which are formed arranged in the stacking direction at the same intervals as the intervals of the support sections, for being inserted in gaps between the pallets supported by the pair of support sections, for being limited to insert in the gaps by bringing in contact with the edge portion of the pallets supported by the support sections that are not mutually opposed.

20 8. The electronic component feeder as claimed in claim 7, wherein the horizontal posture regulating member is fixed on the magazine door section so that the projections are arranged in positions located closer to either one of the support sections away from a possible

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intermediate between the mutually opposed support sections in a state in which the magazine door section is closed.

9. The electronic component feeder as claimed in claim 8, wherein the projections are arranged so that any
5 of the projections interferes with the pallet supported by the support sections which include the other support section displaced by at least one step in the stacking direction with respect to the support section opposed to one support section.

10. The electronic component feeder as claimed in claim 1, wherein

each of the pallets has a pallet unloading grip portion (3d), which has a roughly rectangular shape and is formed roughly in a protruding configuration at an edge
15 portion (3a) located on the forward side in the pallet feed direction, and

the rearward-side regulating member is arranged so as to be able to come in contact with the grip portion of the pallet supported in the reversely directed support
20 posture by the support sections.

11. The electronic component feeder as claimed in claim 7, wherein the projections of the horizontal posture regulating member have a length dimension such that the projections do not reach a place above an arrangement
25 region of the electronic components on the component feed

tray placed on each of the pallets in a state in which the projections are inserted in gaps between the pallets.

12. The electronic component feeder as claimed in claim 1, wherein

5 the feeder further comprises a component feed tray fixation bar (514, 516, 524, 534, 544, 614, 616) for fixing the component feed tray releasably on a placement surface (504, 604) of the pallet, and

the fixation bar comprising:

10 a first direction fixation portion (514a, 524a, 534a, 544a), for releasably fixing its arrangement position on the placement surface, for releasably fixing the placement position of the component feed tray in a first direction (X- or Y-direction) that is a direction along the placement surface by being brought in contact with the component feed tray placed on the placement surface; and

15 a second direction fixation portion (514c, 524c, 534c, 544c), for releasably fixing its arrangement position on the placement surface, for releasably fixing the placement position in a second direction that is a direction roughly perpendicular to the placement surface by being brought in contact with the component feed tray.

20 13. The electronic component feeder as claimed in claim 12, wherein, with regard to the component feed tray fixation bar,

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the first direction fixation portion is the first direction fixation surface (534a, 544a) formed roughly perpendicular to the placement position where the placement position is fixed in the first direction by being brought
5 in contact with an end portion (502a) of the component feed tray, and

the second direction fixation portion is the second direction fixation surface (534c, 544c) formed roughly perpendicular to the placement position where the
10 placement position is fixed in the second direction by being brought in contact with an end portion of the component feed tray.

14. The electronic component feeder as claimed in claim 13, wherein, with regard to the component feed tray
15 fixation bar,

a height position of the second direction fixation surface (544c) brought in contact with the edge portion of the component feed tray is adjustable in the second direction.

20 15. The electronic component feeder as claimed in claim 12, wherein, with regard to the component feed tray fixation bar,

the fixation bar (524) is provided with an urging member (524c) that always urges the second direction
25 fixation portion toward the end portion of the component

feed tray.

16. The electronic component feeder as claimed in claim 13, wherein, with regard to the component feed tray fixation bar,

5 the fixation bar (534) comprising:

a plurality of the second direction fixation surfaces (534c) formed at different height levels; and

a plurality of the first direction fixation surfaces (534a) individually corresponding to the second
10 direction fixation surfaces, and

the placement position of the component feed tray is fixed by the second direction fixation surface that conforms to the height of the end portion of the component feed tray and belongs to the second direction fixation
15 surfaces and the first direction fixation surface that corresponds to the second direction fixation surface.

17. The electronic component feeder as claimed in claim 12, wherein, with regard to the component feed tray fixation bar,

20 the first direction fixation portion is the first direction fixation surface for fixing the placement position in the first direction by being brought in contact with the end portion of the component feed tray,

the second direction fixation portion is the
25 second direction fixation surface for fixing the placement

position in the second direction by being brought in contact with the end portion of the component feed tray, and

the first direction fixation surface and the
5 second direction fixation surface serve as an identical fixation surface (514a) formed inclined with respect to the placement surface.

18. The electronic component feeder as claimed in claim 12, wherein, with regard to the component feed tray
10 fixation bar,

the fixation bar, comprises a magnetic member formed of a magnetic material on or near its arrangement surface on the placement surface, for being fixed on the placement surface by a magnetic force of the magnetic
15 member.

19. An electronic component feeding method for feeding a plurality of electronic components (501) to be mounted on a board by carrying out suction and holding and pickup of the electronic components from a component feed
20 tray (502) in which the electronic components are arranged while being able to be sucked and picked up by a component suction and holding member (561) capable of sucking and holding each of the components with its suction pressure,

the component suction and holding member carrying
25 out the suction and holding and pickup of each of the

electronic components with a component holding and suction pressure (P1) which is a suction pressure that is not lower than a suction pressure capable of sucking and holding the electronic component and lower than a suction pressure capable of sucking and holding the component feed tray.

20. The electronic component feeding method as claimed in claim 19, wherein:

bringing the component suction and holding member in contact with the electronic component by lowering the component suction and holding member after aligning in position the component feed tray with the component suction and holding member;

starting suction by the component suction and holding member so that the suction pressure reaches the component holding and suction pressure when the component suction and holding member brought in contact with the electronic component starts ascending; and

carrying out the suction and holding and pickup of the electronic component with the ascent of the component suction and holding member.

21. The electronic component feeding method as claimed in claim 20, wherein a timing of starting the suction is determined in consideration of a time for which the suction pressure reaches the component holding and suction pressure from the start of the suction by the

component suction and holding member.

22. The electronic component feeding method as claimed in claim 20, wherein starting the suction by the component suction and holding member after the component suction and holding member is brought in contact with the electronic component.

23. The electronic component feeding method as claimed in claim 20, wherein the time for lowering the component suction and holding member is determined according to a size or a weight of the electronic component so as to prevent leap-up of the electronic component from the component feed tray due to the component suction and holding member brought in contact with the electronic component.

24. The electronic component feeding method as claimed in any one of claims 19 through 23, wherein the component holding and suction pressure is a suction pressure determined according to a size or a weight of the electronic component.